

State of Washington  
**Radioactive Materials License**



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As stated in the Nuclear Energy and Radiation Act, Revised Code of Washington 70.98, and the Radiation Protection Regulations, chapters 246-220 through 246-254 of the Washington Administrative Code, and in reliance on statements and commitments made by the licensee identified below, a license is issued authorizing the licensee to transfer, receive, possess, and use the radioactive material authorized below; and to use such radioactive material for the purpose(s) and at the place(s) authorized below. This license is subject to all applicable rules and regulations issued by the State of Washington Department of Health.

<p><b>1. Licensee Name:</b></p> <p><b>FRONTIER GLOBAL SCIENCES, INCORPORATED</b></p> <p><b>(Formerly, Frontier Geosciences, Incorporated.)</b></p>	<p><b>3. License Number:</b></p> <p><b>WN-L0160-1 (ENTIRETY)</b>  <b>Amendment No. 8</b>          Fee Code 65</p>
<p><b>2. Address:</b></p> <p>11720 North Creek Parkway North, Suite 400          Bothell, Washington 98011.</p> <p><b>(Formerly: 414 Pontius Avenue North          Seattle, Washington 98109-5461)</b></p>	<p><b>4. Expiration Date:</b></p> <p>30 April 2015</p> <hr/> <p><b>5. Reference Number(s):</b>          09-04-05. 09-06-04; 09-06-35; 11-12-12; 12-01-06;          12-01-16.</p>

6. Radioactive Material (element and mass number).	7. Chemical and/or Physical Form.	8. Maximum quantity licensee may possess at any one time.
A. Any Radioactive Material, unless otherwise specified.	A. Aqueous, soil, and/or biological tissue.	A. 3.7 megabecquerels (100 microcuries) of any single isotope.  Annual Possession Quantity not to exceed a total of 3.7 megabecquerels (100 microcuries).*, **
B. Hydrogen 3.	B. Aqueous, soil, and/or biological tissue.	B. 37 megabecquerels (1000 microcuries).  Annual Possession Quantity not to exceed 37 megabecquerels (1000 microcuries).*
C. Iodine 125.	C. Aqueous, soil, and/or biological tissue.	C. 0.37 megabecquerel (10 microcuries).  Annual Possession Quantity not to exceed 0.37 megabecquerel (10 microcuries).*

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| D. Carbon 14.  | D. Aqueous, soil,<br>and/or biological<br>tissue. | D. 37 megabecquerels<br>(1000 microcuries).<br><br>Annual Possession Quantity<br>not to exceed<br>37 megabecquerels<br>(1000 microcuries).* |
| E. Iodine 131. | E. Aqueous, soil,<br>and/or biological<br>tissue. | E. 0.37 megabecquerel<br>□□□□□□□□□□<br><br>Annual Possession Quantity<br>not to exceed<br>0.37 megabecquerel<br>(10 microcuries).*          |

\* Annual Possession Quantity as defined in WAC 246-247-030(5).

\*\* In addition to the restrictions in Item 6 and the possession limits in Item 8, the Licensee must further restrict their possession of licensed material to quantities below the limits specified in WAC 246-235-150, Schedule C which require consideration of the need for an emergency plan for responding to release of licensed material and to quantities below the minimum limit specified in WAC 246-235-075 for establishing decommissioning financial assurance.

**CONDITIONS**

9. Authorized Use.
- A. – E. Radionuclides may occur incidental to chemical analysis of environmental samples of water, soil, biological tissue and/or other environmental media, potentially containing radioactive materials.
10. Radioactive materials must be stored and/or used at 414 Pontius Avenue North, Seattle, Washington 98109 or Suite 400 of 11720 North Creek Parkway North, Bothell, Washington 98011.

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11. The licensee must comply with the provisions of chapter 246-220 WAC "Radiation Protection – General Provisions"; chapter 246-221 WAC "Radiation Protection Standards"; chapter 246-222 WAC "Radiation Protection – Worker Rights"; chapter 246-231 WAC "Packaging and Transportation of Radioactive Material; chapter 246-232 WAC "Radiation Protection – Licensing Applicability"; chapter 246-235 WAC "Radiation Protection - Specific Licenses"; chapter 246-247 WAC "Radiation Protection - Air Emissions" and chapter 246-249 WAC "Radioactive Waste - Use of the Commercial Disposal Site."
12. **The Radiation Safety Officer for this program is Gerard Van der Jagt.**
13. **Radioactive material must be used by or under the supervision of Gerard Van der Jagt.**
14. The radioactive materials authorized in this license must not be used in animals, human beings or in products distributed to the public.
15. The licensee is authorized to transport licensed material in accordance with the provisions of Chapter 246-231 WAC, "Packaging and Transportation of Radioactive Material." The licensee must also meet and maintain current U.S. DOT training requirements for shipping and receiving radioactive materials as stated in 49 CFR Part 172, Subpart H – Training; 172.700 through 172.704.
16. The licensee is **not** required to conduct personnel dosimetry program. This is in accordance with the criteria set forth in chapter 246-221 WAC.
17. The licensee's emergency procedures must conform to procedures outlined in the Washington State Radiation Emergency Handbook revised November 1991, or subsequent revisions.
18. The licensee must maintain security and control of any radioactive materials received and possessed under the license in accordance with WAC 246-221-150. Materials must be secured from, or controlled in such a manner so as to prevent unauthorized access or removal from the place of storage.
19. The licensee must maintain a documented running inventory of all unsealed radioactive materials received, possessed, used, transferred and disposed of under the license. The records must include, radionuclides, activities, and disposition. Records must be maintained for inspection by the Department.

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20. All hoods used for storage and/or use of radioactive material must have a flow rate that meets the manufacturer's specifications, with the hood sash at the specified working height. Check hood flow rates annually and maintain records of the annual flow-rate check for inspection by the Department.
21. The licensee is exempt from performing contamination surveys if samples contain concentrations of radioactive materials less than or equal to the concentrations listed in WAC 246-232-130 "Schedule C, exempt concentrations," and the package receipt survey is indistinguishable from background.
22. Surveys are required in use/process areas when radioactive materials are present in samples at concentrations greater than the concentrations listed in WAC 246-232-130 "Schedule C, exempt concentrations;" or if contamination is detected during the receipt survey, documented surveys for contamination must be performed after each use in designated radioactive materials use areas and monthly in storage areas.
  - A. Surveys must include a direct survey done with an appropriate survey instrument (except for low energy beta emitters such as Hydrogen-3, Sulfur-35 and Carbon-14); and a wipe survey counted with an appropriate instrument. low energy beta emitters require a wipe survey counted with a Liquid Scintillation Counter. The licensee may have a consultant perform the survey and analysis.
  - B. Contamination is considered present when the count rate is two (2) times background or greater on an appropriate hand-held survey instrument. If contamination is present the area must be decontaminated, surveyed, and documented until contamination is no longer present.
  - C. Liquid Scintillation Counter results must be converted to disintegrations per minute (dpm) using the nuclide specific efficiency. Contamination is considered above regulatory limits in accordance with the removable wipe limits found in WAC 246-232-140 Schedule D.

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23. **Survey instruments must be calibrated annually, but not to exceed an interval of 13 months, by persons specifically authorized by the Department, the U.S. Nuclear Regulatory Commission, or an Agreement State to perform such services.**

**If a Liquid Scintillation Counter is used for contamination wipe analysis, the licensee must have a quality assurance (QA) program to assure the reliability and accuracy of their Liquid Scintillation Counter/Analyzer and other non-portable counting systems. This QA must be performed at least annually, must be documented, and maintained for inspection by the department. The QA or calibration must show the instrument is operating within +/- 10% of the accuracy obtained after the mfg's calibration. These records must be maintained for five years.**

24. In the event the licensee chooses to terminate their Radioactive Materials License or vacate authorized use locations, the licensee must follow the applicable requirements listed in chapter 246-221 WAC, chapter 246-232 WAC and/or chapter 246-246 WAC.
25. All individuals working directly with radioactive materials or frequenting radioactive materials use areas must receive training commensurate with their duties and responsibilities before beginning work or frequenting the area and at least annually thereafter. At a minimum training must include; health protection considerations of individuals and potential offspring; procedures to minimize exposure; purposes and functions of protective devices; company radioactive material work procedures; applicable state Regulations (Title 246 WAC) and the conditions of this license. Documentation indicating who was trained, subjects and dates must be maintained for inspection by the Department.
26. The Radiation Safety Officer must perform an annual review of the radiation safety program for adherence to the conditions of the license, Title 246 WAC and ALARA concepts. A record of this audit must be maintained for inspection by the Department.
27. The licensee must respond in the manner, and within the time frame, specified to any and all Department correspondence necessary to keep the license and related information current.

Where the licensee has submitted proposed corrective action, such action must be fully implemented in a timely manner, unless the Department has subsequently modified the licensee's proposed corrective action.

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28. To assure the facility remains in compliance with chapter 246-247 WAC, "Radiation Protection - Air Emissions:"
- A. The potential-to-emit dose to the maximally exposed individual must be evaluated every calendar year using the actual Annual Possession Quantity (yearly throughput) for each radionuclide. A Radioactive Air Emissions Attachment is required if the dose from the COMPLY Code is 0.1 mrem/yr or greater from all nuclides.
  - B. This COMPLY code calculation must be performed annually and submitted to the Department by June 30 for the previous calendar year's emissions. If the parameters used for the COMPLY code have not changed during the calendar year evaluation period the calculation is not required. If the calculation is not performed, the licensee is required to send the department a statement that they have not exceeded the Annual Possession Quantity for each nuclide listed on the license.
  - C. The Licensee must maintain these records for five (5) years.
  - D. The licensee must notify the Department if there is a potential or actual increase in air emissions (i.e. modification in the operating system creating additional physical forms of radionuclides given in the Air Emissions Questionnaire for Exempt Status, the addition/acquisition of radionuclides not provided in the Air Emissions Questionnaire for Exempt Status, and/or exceeding the Annual Possession Quantity (yearly throughput) given in the Air Emissions Questionnaire for Exempt Status).
29. Except as specifically provided by this license, the licensee must possess and use radioactive material described in Items 6, 7, and 8 of this license in accordance with statements, representations and procedures contained in the documents listed below. The department's "Rules and Regulations for Radiation Protection" must govern the licensee's statements in applications or letters, unless the statements are more restrictive than the regulations.
- A. Application and attachments dated March 31, 2009

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29. B. Letter and attachments dated June 1, 2009. RE: approval of new Radiation Safety Officer/Authorized User.
- C. Letter and attachments received June 15, 2009. RE: change in survey requirements.
- D. **Email and attachments dated 8 December 2011. RE: new RSO, new Authorized User and add new use location to facilitate move. Email and attachments dated 27 December 2011. RE: Air Emissions information for new facility and decommissioning. Email and letter dated 5 January 2012. RE: Company Name Change.**

FOR THE STATE OF WASHINGTON DEPARTMENT OF HEALTH

Date: 9 January 2012

By: \_\_\_\_\_

  
Anine Grumbles  
Radioactive Materials Licensing

